

1 Specification

2
3 CAMERA NETWORK COMMUNICATION DEVICE
4 *me at*

5 BACKGROUND OF THE INVENTION
6

7 Field of the Invention

8 The present invention relates generally to digital still and
9 video cameras and communication systems, and more particularly to
10 a communication device providing a communication interface between
11 a digital camera and a network system.
12

13 Brief Description of the Prior Art

14 Portable digital cameras are generally treated as PC
15 peripheral devices. With conventional digital cameras, a user
16 takes pictures until the camera memory/disk is filled and then
17 downloads the digital image data to a PC. The camera needs to be
18 either connected to the PC, for example through a cable, or a
19 removable storage device such as a PCMCIA card must be manually
20 transferred from the camera to the PC. The need to regularly make
21 a direct, physical connection to a PC reduces the portable nature
22 of digital cameras. In addition, downloading images to a PC is a
23 local operation. In order to move images into the internet, the
24 user must apply another set of commands on the local PC. Such a
25 system is described in U.S. Patent No. 5,475,441 by Parulski et
26 al. Cameras are also incorporated into integrated systems for
27 displaying an image, such as a visual surveillance system in a
28 retail store. U.S. Patent No. 5,444,483 by Maeda discloses a
29 system including a digital camera with processing circuitry for
30 display on a television screen.

31 Another limitation of conventional digital cameras is that
32 there is no direct way to identify an image once it is loaded onto
33 the PC. Additional information must be added manually, such as
34 operator name, account number, camera of origin, etc. Also, there
35 is no way of securing the images to assure that an operator does

1 not alter them once loaded into a PC, or that the images will not
2 be viewed by an unauthorized person as part of the transmission of
3 the images from the PC to a remote location.

4 5 SUMMARY OF THE INVENTION

6 It is therefore an object of the present invention to provide
7 an apparatus to serve as an interface for enabling a user of a
8 portable still and or video digital camera to send image data
9 directly from the camera to a communication network for
10 transmission and downloading to a remote network location or
11 remote computer.

12 It is a further object of the present invention to provide an
13 apparatus enabling a user of a conventional digital camera
14 designed to only download directly to a PC, to send camera data
15 directly from the camera to a communication network for
16 transmission and downloading to a remote network location or
17 remote computer.

18 It is a still further object of the present invention to
19 provide an apparatus that performs operations to secure the camera
20 data against unauthorized use during transmission through an
21 insecure communications network, and storage in an otherwise
22 unsecure remote destination.

23 It is a still further object of the present invention to
24 provide an apparatus for downloading image data from a variety of
25 digital cameras to a remote computer through a selected
26 communication network by means of an interface selected from a
27 group, including but not limited to a modem, an ethernet adapter,
28 a router, a hub, or infrared and other wireless connection.

29 It is another object of the present invention to provide an
30 apparatus that can receive and encrypt and/or mark image data from
31 a camera and transmit the encrypted/marked data to a remote
32 computer.

33 It is another object of the present invention to provide an
34 apparatus that can receive image data from a camera and transmit
35 the data to a remote computer along with additional annotation

1 data including but not limited to time and date, user information,
2 location information, and camera information.

3 It is an object of the present invention to provide an
4 apparatus for connecting a digital camera output to a remote
5 computer, the apparatus being responsive to a Smart Card to
6 program the apparatus and the camera, and to allow an authorized
7 user to operate the apparatus.

8 It is another object of the present invention to provide an
9 apparatus for use with a digital camera, that can control the
10 camera by means of programming, or in response to
11 information/direction from a remote computerized destination.

12 It is another objective of the present invention to provide
13 an apparatus for use with a digital camera, that can be programmed
14 by a PC using the same interface on the apparatus that would later
15 be used to communicate with the camera.

16 It is a still further objective of the present invention to
17 provide a still and or video digital camera capable of downloading
18 image data to a remote computer through a selected communication
19 network by means of an interface selected from the group including
20 but not limited to a modem, an ethernet adapter, a router, a hub,
21 or infrared or other wireless connection.

22 It is another objective of the present invention to provide a
23 digital camera, and a device for use with a digital camera, that
24 automatically performs operations dependent on camera or device
25 programming, or in response to information/direction from a remote
26 computerized destination.

27 Briefly, a preferred embodiment of the present invention
28 includes a communication device for interconnecting a digital
29 camera to a communication network for downloading data to a remote
30 computer. The device has a network communication port for
31 establishing communication with a network via a pre-defined
32 protocol and communication mode, and has a camera communication
33 port such as a serial, parallel, SCSI, USB or Irda-port that
34 imitates the back end application of a PC, for connection to a
35 digital camera for sending and receiving data to and from the
36 camera. The camera communication port is also used for input of

1 programming and setup data to the communication device from a PC.
2 The device can be programmed to operate on the data directly, such
3 as in the case of data for storage or operational direction,
4 and/or direct the data to the camera. The device may also have a
5 Smart card socket into which a user can insert a card to input
6 data, such as user and camera I.D., user authorization, image
7 marking, camera operational parameters, remote computer/
8 destination address, etc. The device can be programmed to perform
9 encryption, authentication, watermarking and fingerprinting
10 procedures, as well as structuring the data for transmission over
11 a particular network, and to automatically perform operations,
12 such as at specific times or in response to data input.

13 An advantage of the present invention is that a digital
14 camera user can download image camera data to a remote computer or
15 network site and therefore avoid the concern of the need to
16 connect the camera or its removable device to a local computer in
17 order to perform such operation.

18 Another advantage of the present invention is that it gives
19 the camera user the capability of automatically securing the
20 camera data, for example by encrypting or marking the data prior
21 to sending it over a communication system and downloading it to a
22 computer.

23 Another advantage of the present invention is that it adds
24 functionality to cameras that are not designed specifically to
25 perform the task of connection to a remote network.

26 A further advantage of the present invention is that it
27 provides an apparatus with a connection to a camera that is
28 programmable for customized operations.

29 Another advantage of the present invention is that it
30 provides an apparatus that enables a user to send data from a
31 digital camera through a network to a plurality of destinations of
32 a variety of types, such as network printers and remote archives.

33 34 IN THE DRAWING

35 Fig. 1 illustrates the communication device of the present
36 invention interconnected to a camera and communication network;

1 Fig. 2 illustrates a device that connects to a camera through
2 a removable card interface;

3 Fig. 3 is a block diagram of the communication device;

4 Fig. 4 illustrates the communication device connected to a
5 network through one or more types of network connections;

6 Fig. 5 illustrates a communication device connected to more
7 than one network;

8 Fig. 6 demonstrates various ways of interconnecting the
9 communication device to a camera;

10 Fig. 7 summarizes various programming and operational
11 options;

12 Fig. 8 summarizes various operations that the communication
13 device can perform on images;

14 Fig. 9 shows an alternate embodiment wherein the
15 communication device is integrated with a camera;

16 Fig. 10 illustrates an embodiment of the present invention
17 wherein a communication device is configured for connecting data
18 from a camera directly to a video/TV receiver;

19 Fig. 11 illustrates a communication device configured for
20 sending different data to separate destinations;

21 Fig. 12 illustrates a communication device configured for
22 distinguishing two sets of data and sending one set to one
23 location and another to a second location.

24 Fig. 13 illustrates a plurality of cameras each communicating
25 through a communication device to a single destination;

26 Fig. 14 is a flow chart illustrating automation related to
27 the communication device;

28 Fig. 15 is a flow chart illustrating automation related to
29 the destination device;

30 Fig. 16 presents summaries of types of data that can be sent
31 from the destination to the communication device, and processing
32 that can be done by the destination; and

33 Fig. 17 is a flow chart illustrating automation in a camera
34 having a built-in communication device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to Fig. 1 of the drawing, a preferred embodiment of the communication device 10 of the present invention is illustrated in use with a digital camera 12, PC 14, communication network 16 and a remote destination 18, which can be any type of network object, such as a PC, a printer, phone switch, server, etc. The device 10 has a camera communication port 20 for interconnection to either the camera 12 as indicated by cable 22 to port 24, or to the PC 14 through cable 26. The dashed lines 28 are to indicate that either the camera 12 or PC 14 can be connected to port 20. The device 10 has a network communication port 30 shown connected to the network 16 through line 32, and a Smart card port 34 for installation of a Smart card 36. The connection between the remote destination 18 to the network 16 is indicated by line 38. The communication device 10 includes any of various communication or network apparatus for sending data through the network 16.

The use of the communication device 10 involves first programming it as required. Programming is accomplished through use of a PC 14 connected to port 20 and/or through data entry from the Smart card 36 through the port 34 and/or from a remote computer at destination 18 by way of the network 16. Examples of programming options will be given in the following detailed description. Generally, the device 10 can be programmed to send instructions and data to the camera and to perform operations on data received from the camera, and to send data to the specified remote destination 18 by way of the network 16. Typical uses of the Smart card are for entry of additional data such as a user I.D., camera ID, an address or phone number of the remote destination/network site 18, operational instructions to the camera 12 and communication device 10, etc.

The primary function of the communication device 10 is to perform the necessary operations required to receive data from the camera 12 and then to send the data to the remote destination 18 by way of a selected communication media indicated by network 16.

1 Other operations/functions will be described in the following
2 specification.

3 The input 20 of the device 10 imitates the back end
4 application of a PC, thus becoming transparent to the camera that
5 operates as if it is communicating to a PC. The communication
6 device 10 establishes communication with a network 16 via a pre-
7 defined protocol and communication mode. The device 10 receives
8 image data and other information data from a camera 12, and
9 secures the data and structures it according to the required
10 protocol, performs any other programmed operations, and then sends
11 the data through the network for transmission to a destination
12 device 18, such as a computer, printer, server, phone switch,
13 etc., placing the data in assigned locations as defined by the
14 device ID or commands. Communication between the device 10 and
15 the destination device can be bi-directional, i.e. a destination
16 device host 18 can download information to the communication
17 device 10 as well as receive information. Any and all types of
18 media are included in the spirit of the present invention.
19 Particular embodiments of the communication device 10 include the
20 functions of one or more devices including a telephone modem,
21 ethernet adapter, a router, hub, etc. The device 10 can also be
22 configured to transmit through a wireless communication link, such
23 as satellite communication, etc. Signals include infrared, or any
24 RF frequency such as UHF, VHF, or microwave.

25 In wireless communication between the device 10 and
26 destination 18, line 32 is replaced with a wireless connection
27 between the device 10 and the network 16, as indicated by
28 antenna/emitter 40 on the communication device 10 and transceiver
29 42 connected to the network 16.

30 Fig. 1 also shows wireless communication between the camera
31 12 and communication device 10, indicated by a transceiver 44
32 connected to the camera port 24, and an antenna/emitter 46 on the
33 communication device 10 for sending and receiving data between the
34 camera 12 and device 10. All types of radiated signals are
35 included in the spirit of the invention, the particular type
36 depending on such factors as distance and environment, etc.

1 Because the device 10 is programmable, there is significant
2 flexibility in its use. For example, device 10 can be programmed
3 to perform functions automatically, for example to receive
4 instruction from a destination device/host computer 18 to direct
5 the camera to take a picture at a particular time of day, or every
6 hour and/or to download images or upload information at a specific
7 time from the camera. The device 10 can be programmed by a
8 destination device 18 to operate a camera "off-line". After
9 uploading the instruction to the device 10, the communication can
10 be terminated. The device 10 can keep the instructions and send
11 them to the camera appropriately.

12 In another example, the device 10 can be programmed to
13 automatically connect to the network 16 when the camera image data
14 storage is full, or partially full, and then to download the image
15 data and subsequently disconnect from the network 16. Upon
16 completion of downloading and receiving a confirmation from the
17 destination 18, the device 10 can continue by deleting the image
18 data from the camera.

19 The communication device 10, or camera if it is programmable,
20 can also be loaded with information to accompany an image, and
21 this information can be included, for example, in an image header.
22 Examples of valuable information may include an account number and
23 a camera ID. The device 10 can be programmed to automatically
24 include this information with image data downloaded to a
25 destination. Such identification avoids confusion as to the
26 source of the image.

27 The communication device is designed with selected features
28 permanently programmed. An alternate embodiment of the present
29 invention includes permanent programming to allow downloading of
30 data only to a specific destination. Such fixed programming helps
31 avoid theft of the device or camera for a different use. In
32 general, it is a specific feature of the present invention to
33 provide a device with permanent programming for any specific
34 purpose.

35 Another alternate embodiment includes fixed programming to
36 automatically request and receive a camera ID from the destination

1 device 18, and/or smart card 36 when connected to either of these.
2 The camera ID is then included along with image data. A still
3 further embodiment includes permanent programming to read and
4 increment a counter and assign a unique number to each image
5 received. In this way each image has associated with it a unique
6 number, and the ID of the camera that secured the image. The
7 programming for these functions will be understood by those
8 skilled in the art, and is not shown. The required clock,
9 counter, ROM and other necessary circuit components are
10 illustrated in block form in Fig. 3. In an embodiment wherein the
11 communication device is integrated with a digital camera, the
12 camera ID is programmed into ROM, and therefore no additional
13 request or receiving of a camera ID is required. The operation of
14 including an image number is accomplished in the same manner as
15 with the separate communication device. The integrated camera and
16 communication device will be more fully described in the following
17 text in reference to Fig. 9 of the drawing.

18 Other embodiments of the communication device 10 include the
19 incorporation of visual 48 and sound 50 indicators to inform a
20 user concerning operations that need to be accomplished. These
21 can function either off or on line. For example, the alarm/sound
22 indicator 50 can be programmed to sound, and/or the visual
23 indicator can light if the device 10 is programmed to connect the
24 camera to the network at a specific time and there is no
25 connection. The indicators can also give notice when the image
26 storage has reached a certain level. A visual display 52 is
27 optional for presentation of useful information such as the
28 remaining number of images to be sent to a destination 18, the
29 remaining time required for transmission, notice of connection to
30 a camera 12, and notice of connection to a destination 18.
31 Internally, the device 10 includes a counter to maintain the image
32 count for display as discussed above, and may optionally also
33 include a clock for use in indicating the date and time of
34 receiving an image on the display 52.

35 An alternate construction 54 of a device that is functionally
36 similar to device 10 is shown in Fig. 2 wherein the connection

1 from the device 54 to a camera 56, or to the PC 14 is made through
2 a removable storage interface such as a PCMCIA card, SamrtMedia
3 CompactFlash Klik! Card, etc. For example, a PCMCIA card 36 can
4 be placed in the camera card slot 58 and camera data can be
5 downloaded to the card 36. The card 36 can then be placed in the
6 device 54 slot 60, and the camera data can be loaded into the
7 device 54 for processing and transmission through connection 62 to
8 a destination 20. An alternate embodiment is also indicated in
9 Fig. 2, wherein a PCMCIA card extension 64 is provided for
10 installation in the PCMCIA card slot 58 of the camera 56. Other
11 configurations and types of connections in the design of the
12 communication device will be apparent to those skilled in the art
13 and these are to be included in the spirit of the present
14 invention.

15 Referring to Fig. 3, the internal structure of the
16 communication device 10 is shown in block form. A processor 66
17 performs operations according to specific programming generally
18 indicated by the image processing block 68, and coordinates the
19 activation of the communication device 10. Specifically noted in
20 the processor block 66 are the operations of maintaining the time
21 and date (clock 70), for inclusion with image data to indicate the
22 time and date of the image processing. The processor also keeps an
23 account of the number of images received and sent (block 72), for
24 display on the LED screen 52, and processes additional data (block
25 74) for various purposes, including user data to be included with
26 image data. In addition, the processor performs security
27 operations when programmed to do so (block 76). Typically, a ROM
28 78 is provided to store permanently programmed data, and a RAM 80
29 is used for temporary storage. Specific camera communication
30 apparatus includes a camera connection controller 82, and an
31 optional infrared transceiver 84 for a wireless connection to the
32 camera. The camera controller 82 connects to the camera through
33 port 20 and/or the transceiver 84, and additional connective
34 hardware as indicated in Fig. 1. The network communication
35 apparatus similarly includes, in addition to the processor and
36 memory blocks, a network connection controller 86, communicating

1 with the network through line 32 and/or connected to a modem 88
2 through bus 90 and then to the network through a modem output bus
3 92 and/or a bus 94 to a transceiver 96 to the antenna/emitter 40
4 via a bus 98 for a wireless connection to the network. Similarly,
5 the camera connection controller 82 is optionally connected via
6 bus 83 to a transceiver 84 connected through bus 85 to
7 antenna/emitter 46 for communication with the camera 12. The user
8 indicators are operated through a user interface controller 108.
9 The indicators include a battery condition indicator 110, the
10 alarm light 48, the sound alarm 50, a power switch 112, and the
11 LED display 52. The power supply 114 is also indicated with
12 options including a battery 116, an AC battery charging supply
13 input 118, a phone line power connection 120 and a line 122 from
14 an alternate power bus, not shown.

15 Fig. 4 illustrates accommodation of a number of types of
16 network connections with a single communication device 124,
17 including device circuitry 126 similar to that shown in Fig. 3,
18 including a modem 128 and also an Ethernet adapter 130, a router
19 132, a hub 134, an infrared link 136 and/or any wireless
20 connection 138. The device 124 can be configured to provide
21 compatible data format for any one or more of the possible types
22 of network connections, either individually or simultaneously. In
23 the case of simultaneous output to more than one media, the device
24 124 includes a separate output for each type of connection. The
25 various selected connection types can each transmit through a
26 corresponding part of network 16 to a single computer or remote
27 network node 18, or they can each output to a different remote
28 destination, such as illustrated in Fig. 5 where output from a
29 camera 12 is sent by a communication device 140 by way of an
30 ethernet adapter 130 through a network 139 to a first remote
31 computer 142, and also by way of a wireless connection/transceiver
32 138 to a transceiver 42, through a network 141 to a second remote
33 computer 146, or alternately to the computer 142 as indicated by
34 line 148.

35 The communication devices described in this disclosure can be
36 connected to a camera by any of a variety of port types. This is

1 illustrated in Fig. 6 showing a camera 150 connected to a
2 communication device 152 by way of serial ports 154, 156, SCSI
3 ports 158, 160, IrDa ports 162, 164, parallel ports 166, 168 and
4 USB ports 170, 172 from communication device 152 to the camera
5 150. The device 152 can have any combination of outputs and other
6 features as described for communication devices elsewhere in this
7 disclosure. As shown, the device 152 has an output port 174 and
8 an optional Smart card port 176 for use with a Smart card 36. The
9 various interconnecting lines or media are simply noted as lines
10 178, each configured appropriately for the type of port. In the
11 case of infrared communication the corresponding line 178 is not a
12 physical communication cable but rather an unobstructed line of
13 view. The camera and communication device can have one or more of
14 the ports shown in Fig. 6. The spirit of the present invention
15 includes other communication lines or media between the camera and
16 communication device in addition to those shown in reference to
17 Fig. 6, and between the communication device and a remote computer
18 in addition to those illustrated in reference to Fig. 4. Such
19 variations will be apparent to those skilled in the art.

20 As discussed above, the communication device of the present
21 invention provides downloading of camera images onto computerized
22 systems in an automated manner. The communication device is
23 programmed to include information about the camera, the remote
24 computer and intervening network and the corresponding method of
25 transporting the information.

26 In addition to these more general features of the
27 communication device, numerous programming and operational options
28 are included in the spirit of the present invention, examples of
29 which are given in the lists of Fig. 7. The types of connections
30 from the communication device to a network were illustrated in
31 detail in Fig. 4. These options are also listed in Fig. 7 under
32 the heading "Device Connection to Network". Such connections
33 require specific ordering/arranging of data known as protocols.
34 Typical protocols are listed in Fig. 7 under "Device to Network
35 Protocols". A user will also often find it convenient to include
36 the camera serial number or any other unique identification, along

1 with the image information. Certain types of camera information
2 are listed under "Device Information Re Camera", and this and
3 other camera information are programmed into a device by use of
4 the Smart card installed for example in port 34 of Fig. 1, or by
5 use of a PC by way of port 20, or from a remote computer at 18 as
6 illustrated in Fig. 1, or by other means that will be apparent to
7 those skilled in the art.

8 In the same way, information regarding the identity by the
9 particular communication device, and other information can be
10 programmed into the device. Examples include a unique
11 communication device ID, the date and time maintained by a built-
12 in clock, the number of images stored and/or downloaded, and the
13 numbers retained on a consecutive image counter in the
14 communication device. These features are also listed in Fig. 7
15 under DEVICE GENERATED INFORMATION.

16 The communication device is also programmed with information
17 concerning the destination 18, which normally will be a remote PC,
18 but could be some other apparatus such as a video monitor or a
19 printer, etc. This type of information is listed under "Device
20 Information Re Destination" in Fig. 7.

21 Requiring a user password avoids the possibility that an
22 unauthorized person will alter data. Phone number and IP address
23 data can also be loaded into the communication device, and are
24 listed under "Operational Information for Devices and/or Camera"
25 in Fig. 7. Detailed examples of operations to be performed on
26 images will be discussed in reference to Fig. 8.

27 The communication device programming also includes
28 instructions that are then sent by the communication device to the
29 camera, examples of which are listed in Fig. 7 under "Instruction
30 to Camera From Device".

31 The purpose of the communication device is to receive
32 information from the camera and then to store it, or modify it,
33 and/or add to it according to the program and data, and send the
34 required data to the network. Examples of data received from the
35 camera are listed in Fig. 7 under "Device Information From
36 Camera". Examples of operations performed on image data are

1 included in the list of Fig. 8. A particular embodiment includes
2 the device programmed to add identifiers to the image, such as
3 including the date and time of image acquisition, the user's name,
4 a unique camera I.D. or image I.D. and the date and time of
5 transmission. This data can be placed on the image, or in an
6 image header, or outside the image area. The communication device
7 can also be programmed to mark, i.e. watermark or finger print,
8 which are invisible marks, the images for the purpose of deterring
9 unauthorized use, and/or it can be programmed to prepare image
10 authentication data, or to encrypt the entire set of image data to
11 prevent any unauthorized person from viewing the image. For
12 example, the communication device can be programmed to store and
13 encrypt selected image data points for comparison with data from
14 corresponding locations of a questionable image at a later time.

15 It is noted in Fig. 8 that the device can also perform other
16 operations such as compressing or expanding files, and parsing
17 files and converting them to different formats.

18 The specific items listed in Figs. 7 and 8, and discussed
19 above concerning programming of the communication device are all
20 given by way of example. The basic objective of the present
21 invention is to provide a communication device that will allow a
22 digital camera to be connected to one or more types of
23 communication networks for downloading of data to, and receiving
24 data from a remote destination, which is typically a computer.
25 Details of the circuitry and programming of the communication
26 device do not need to be described in this disclosure because
27 those skilled in the art of digital apparatus will understand how
28 to design the device to perform the operations disclosed and
29 claimed herein.

30 The embodiments of the present invention illustrated above
31 are preferred embodiments. The communication device is
32 particularly useful in these forms in that it allows existing
33 digital cameras that do not have the functionality to connect to a
34 network, to be connected to any of a variety of communication
35 networks for transmission of image data and receiving
36 instructions. Existing digital cameras do not have to be modified

1 to function with the communication device of the present invention
2 because an interconnection is made through an existing camera port
3 using the existing protocol.

4 An alternate embodiment of the present invention is
5 illustrated in Fig. 9 wherein a communication device 180 is
6 integrated inside a digital camera 182 containing a digital camera
7 section 184. The novel digital camera 182 can send and receive
8 data to and from a communication network. The camera 182 in this
9 embodiment has a serial port 186 for connection to a line 188 to a
10 PC for receiving programming data, for use in a downloading image
11 data directly to a PC, as in a conventional digital camera. The
12 camera 182 also has one or more communication ports 190 for
13 connection to one or more lines 192 to a communication network.
14 The network communication options discussed for example in
15 reference to Figs. 4 and 5 also apply to the device 180 of Fig. 9.
16 The operation of the device portion 180, and various features such
17 as the display, indicators, etc. are the same as discussed above
18 in regard to the external communication devices such as 10 or 124.
19 Port 190 is for acceptance of a Smart card 36. Other optional
20 features are not repeated in Fig. 9 for simplicity and to avoid
21 redundant discussion.

22 Fig. 10 illustrates an embodiment of the invention wherein a
23 communication device 192 is configured for connecting data from a
24 camera 194 directly to a video/TV receiver 196. This connectivity
25 allows both preview of live images from the camera as well as
26 post-view or playback of either still images, or video when
27 applicable.

28 Figs. 11 and 12 illustrate communication devices that are
29 configured for transmission to separate destinations. Fig. 11
30 illustrates a case where the camera 198 is capable of outputting
31 first and second sets of data on lines 200 and 202 respectively,
32 to a communication device 204, and wherein it is desirable to send
33 a first set of data to a first destination 206 and a second set of
34 data to a second destination 208. For example, a journalist may
35 want to send high resolution data to his private PC at destination
36 206 and send low resolution data to a potential customer for

1 preview at destination 208 prior to placing a purchase order for
2 the image.

3 Other applications include "escrow" security transmissions
4 where images "first data" are sent to a first location 206, and
5 other information "second data" is automatically sent to a
6 second location/recipient 208. In the case of secured images, an
7 authenticated image can be sent to a first location such as 206
8 and an image signature and/or authentication data can be sent to a
9 second location 208. Similarly, encrypted or watermarked data can
10 be sent to a first location, and original data to a second
11 location.

12 In the case where the camera cannot provide both the first
13 and second data, the second data can be prepared by the
14 communication device, as illustrated in Fig. 12. In this case,
15 the camera 210 only outputs original image data. The
16 communication device 212 is programmed to create encrypted image
17 data and/or authentication data, or include other data, and then
18 output first selected data to a first destination/location 206 and
19 a second set of data to location/destination 208.

20 As referred to in the above description, the device of the
21 present invention performs operations in an automated manner.
22 Novel methods of operation of the communication device and/or
23 integrated camera device will now be described in greater detail.

24 The communication devices described above, used in a system,
25 for example the system described in Fig. 1 wherein a programmable
26 communication device 10 interconnects a camera 12 with a
27 destination 18, or a similar system with a communication device
28 integrated with a camera as described in reference to Fig. 9,
29 provide a structure capable of automatic and intelligent
30 operation. The computerized destination 18 can be of various
31 configurations, including a single PC or a network server.

32 The method and apparatus of the present invention in
33 automatic operation has great utility when a plurality of
34 communication devices, either as separate devices or integrated
35 with a camera, are in service and attempts are made to download
36 image data. Image data requires a large memory, and downloading

1 from a number of communication devices is time consuming.
2 Networks encountering such a load of image data can easily be
3 overloaded, requiring either large increases in network band
4 width, or a method of organizing the downloading in an automated
5 manner. Such automation is a particularly useful feature of an
6 embodiment of the present invention and is illustrated in Fig. 13
7 where three sets of cameras 214, 216, and 218 and communication
8 devices 220, 222, and 224 are connected to a single destination
9 226 through a network 228.

10 Various ways of automating the transfer of image data from
11 the cameras to the destination will be understood by those skilled
12 in the art of automation after reading the description of the
13 invention. A preferred embodiment involves programming the
14 devices 220, 222, and 224 to automatically "re-dial" for a hook-
15 up with the destination when a busy signal is received. The
16 destination simply accepts a first call and ignores subsequent
17 calls until the processing of the first call is complete. An
18 alternate method includes the destination storing the numbers of
19 the calling communication devices in the order received, and then
20 notifying the next device in line when the destination is ready
21 for accepting the next download. This approach has an advantage
22 over the re-dialing approach in guaranteeing each device its
23 priority.

24 Referring now to Fig. 14, an example is illustrated wherein a
25 communication device is programmed to perform automatic
26 operations. Block 230 (set up device) represents the programming
27 that is accomplished through use of a PC 14, Smart card 36, or the
28 computer/destination 18 through a network 16. Fig. 14 is a
29 simplified example of programmed decisions made by a communication
30 device. Details of programming for such operations are well
31 understood by those skilled in the art and therefore are not
32 described in detail.

33 The example of Fig. 14 illustrates the communication device,
34 for example device 10, programmed to query the camera
35 communication port 20 to determine if a camera is connected. The
36 communication device, for example, can be programmed to check for

1 a camera connection (block 232) at periodic intervals, or at
2 certain times of the day. If the camera is connected, the
3 communication device can then receive and evaluate data from the
4 camera, an operation which can be fully automatic if the camera is
5 programmed to receive and respond to commands through line 22. If
6 not, a user can manually trigger the camera 12 to download the
7 data to the communication device. In either the case of automatic
8 or manual download to the communication device, block 234
9 represents this function. Block 236 indicates an option for a
10 compatible camera 12, wherein the communication device queries the
11 camera to determine what percentage of the image storage capacity
12 is filled. If it exceeds a certain predetermined amount, for
13 example 75%, the communication device responds by instructing the
14 camera 12 to download the image data (block 234). If not, the
15 device can continue to check for a camera connection and image
16 memory available on a periodic basis, and/or at certain times.

17 Once image data is loaded, the communication device can
18 respond to programming to perform any of a variety of operations
19 as discussed above, such as encrypting, creating authentication
20 data and relegating selected data for subsequent transmission to
21 one or more destinations. This is indicated simply as block 238.

22 The communication device can be programmed to send the
23 relegated data at certain times. This programming is symbolically
24 indicated by block 240, and at the programmed time the device
25 checks the output port 30 (Fig. 1) to determine if a connection is
26 made to a network (block 242). If so, the communication device
27 further checks to determine if the destination is connected and
28 ready. This is indicated by block 244 for a single destination
29 and by blocks 246 and 248 for two separate destinations, although
30 any number of destinations are within the scope of the present
31 invention.

32 Once the communication device determines that the destination
33 is ready, the data is transmitted as indicated by blocks 250, 252
34 and 254. Block 250 also indicates an option indicating
35 programming of the communication device to include a unique ID
36 with the transmitted data to connect the data to a specific

1 location, i.e. database, within the destination. The purpose of
2 Fig. 14 is primarily to illustrate automation within the
3 communication devices of the present invention. Automation is
4 also possible in the destination 18, and in the camera 12 in those
5 cases where the camera 12 is programmable.

6 Fig. 15 will now be used to discuss automation within the
7 destination 18. It should also be understood that the present
8 invention includes combinations in which automation occurs in the
9 communication device, camera and destination, or in any
10 combination of the three to accomplish required programming
11 objectives.

12 Block 258 of Fig. 15 symbolizes programming of the
13 destination 18 to perform operations, examples of which will be
14 described in reference to the various blocks of Fig. 15. Block
15 260 indicates the destination determining if the communication
16 device is connected to the network. The destination can be
17 programmed to check for a connection at various intervals or times
18 of day, etc. The destination can also be programmed to respond to
19 a signal from the communication device indicating a requirement to
20 transmit data. Both of these options, either an active query to
21 the communication device or a response from the communication
22 device are included in the step indicated by block 260.

23 Once connection is established between the destination and
24 the communication device, the destination can send instructions to
25 the communication device as indicated by block 262. As with block
26 260, this action by the destination can be self initiated or in
27 response to an instruction received from the communication device
28 to send data. The data is then received by the destination (block
29 264) and processed (block 266). The communication device can be
30 either separate from the camera or integrated with it.

31 Fig. 16 lists examples of data that can be sent by a
32 destination to a communication device including instructions to
33 the communication device to direct the camera to take a picture at
34 a set time or at certain intervals. Account identification,
35 titles or other information can be sent for inclusion in an image
36 header, or for watermarking, etc. Operational data can be sent to

1 inform the user when and where to take a picture. A map showing
2 where to take a picture can be sent, for example, which can be
3 displayed by the user on a camera visual display, and corrective
4 notices can be sent informing the user of any problems with the
5 downloaded image data such as chronic underexposure, focus
6 problems, etc. The destination can also send instructions to the
7 communication device to check camera memory, download data,
8 encrypt data, etc., all controlled by the destination.

9 Upon receiving data from the communication device (block
10 264), the destination can automatically process the data according
11 to specific programmed objectives (block 266). A number of
12 possibilities are included in Fig. 16 under "Data Processing by
13 Destination". In cases where data is received in unencrypted
14 form, it can encrypt and store the data, or it can decrypt
15 encrypted data and print images automatically or archive them.
16 The destination 18 can also automatically distribute selected data
17 items to other remote locations, such as on the web, or e-mail at
18 a low resolution image for inspection prior to a sale. The
19 destination can also store authentication data of an original
20 image and create corresponding authentication data from a
21 questionable image, and compare the two sets of authentication
22 data to determine the validity of the questionable image.

23 In summary of the automatic features of the invention, the
24 destination, for example a server, can call the communication
25 device to notify it of a particular time to send data to a server,
26 for example based on local and remote network load, server
27 processing load, server storage capacity, fulfillment (printing),
28 system load, and other factors. As explained above, there may be
29 querying/handshaking between the communication device and the
30 server to determine if there are sufficient images to send, i.e.
31 to determine the space available in the image storage memory of
32 the communication device or camera-device. Alternatively, the
33 communication device can query the destination to initiate the
34 sending of data.

35 Another automatic feature of the present invention is the
36 automatic inclusion of prescribed information along with image

MSA2
1 data, such information including for example, a unique ID, date,
2 time, etc. ¹² Closely related to the information included with an
3 image is a phone number or network IP received by the device or
4 camera for automatic dialing to a destination. The communication
5 device can also automatically receive images and related
6 information by querying the destination at preprogrammed
7 times/intervals. Another automatic feature includes automatic
8 downloading based on priority when some users have priority over
9 others.

10 Fig. 17 applies to the integrated camera-device of Fig. 9.
11 The camera-device is first programmed as indicated by block 268.
12 A picture is taken (block 270), and the programmed operations are
13 performed (block 272). The camera-device can then check memory
14 to determine if data should be downloaded (block 274). If memory
15 space is low, the camera-device will check for a network
16 connection (block 276) and alternatively also display a notice to
17 the user of low storage capacity available (block 278). Once a
18 connection is made to the network, the data is downloaded (block
19 280). In general, all of the features discussed relative to the
20 communication device 10 apply also to the camera 182 with an
21 integrated communication device 180 as illustrated in Fig. 9,
22 except for those comments that refer to the external connection
23 between the camera and the communications device.

24 Although the present invention has been described above in
25 terms of a specific embodiment, it is anticipated that alterations
26 and modifications thereof will no doubt become apparent to those
27 skilled in the art. It is therefore intended that the following
28 claims be interpreted as covering all such alterations and
29 modifications as fall within the true spirit and scope of the
30 invention.

31 What is claimed is: